

NOTES.

SEVERAL weeks ago the announcement was made that an Italian Government Commission, appointed to inquire into the condition of the Leaning Tower of Pisa, had reported that the structure was in danger of collapse (July 14, p. 48). We are glad to be able to print in the present issue the translation of an article by Prof. A. Battelli, professor of physics in the University of Pisa, in which the facts with reference to the tower are clearly stated. The article should serve to moderate anxiety for the safety of this famous structure.

It is stated by the Paris correspondent of the *Times* that the Government of the Republic of Ecuador has proposed to present to France the observatory at Quito, together with its apparatus and dependencies, and that the Academy of Sciences has decided provisionally to accept the gift.

WE regret to see the announcement of the death of the Rev. Robert Harley, F.R.S., on July 26, at eighty-two years of age.

THE Paris correspondent of the *Times* states, on the authority of the *Dépêche Coloniale*, that M. Louis Gentil, professor of geology at the Sorbonne, who accompanied the expedition which recently explored the Atlas region under the auspices of the Comité du Maroc, has been entrusted by the French Minister of Public Instruction with a mission to the Muluya Valley, where he will complete his scientific researches in the Algero-Moroccan frontier district.

THE famous extinct geyser of Waimangu, New Zealand, near which a volcanic eruption was reported last week as having commenced, was for a few years the most powerful geyser on record. The activity of this geyser in 1903 and 1904 created such anxiety in the North Island of New Zealand that an Auckland paper, attributing its activity to the great increase in the size of the adjacent Lake Rotomahana, proposed that the lake should be drained in order to allow the freer outlet from the hot springs of the locality. No action was taken, and the danger was removed by the bursting of the lake dam. The water of Lake Rotomahana was discharged to Lake Rotorua, and Waimangu ceased its eruptions. It will be interesting to learn from the New Zealand geologists whether the renewal of the volcanic activity along the Tarawera rift is connected with the cessation of Waimangu.

THE executive committee formed for the purpose of organising and holding a great International Horticultural Exhibition in London in the spring of 1912 is now doing everything possible to push forward the necessary arrangements. The honorary secretary of the committee is Mr. Edward White, 7 Victoria Street, Westminster, S.W. The exhibition will be held in May, and it will be open to the public on eight weekdays. Although in no way responsible for the exhibition, the Royal Horticultural Society is extending its general approval to the scheme. This society has not only agreed to forgo the holding of the usual Temple Flower Show for that year, but it has also contributed a sum of 1000*l.* towards the International Exhibition, and in addition is prepared to assist generously in the formation of a guarantee fund.

It is seldom that for the period of a whole month there is such a failure of summer weather as was experienced this year throughout July. There were in all only five days at Greenwich with a temperature of 70° or above, and this is the smallest number of warm days in any July since trustworthy records were commenced in 1841, about

seventy years ago. The July with the next fewest number of warm days was in 1879, when there were eight days with the temperature above 70°, whilst there have only been four Julys during the last thirty years with fewer than twenty such warm days, and as recently as 1905 the temperature of 70° was exceeded in July on twenty-nine days. In the last nineteen years there have only been two Julys besides last month in which the shade temperature failed to touch 80°. The mean temperature for the month was 60°, which is 4° below the average of the past sixty years, and it is 1.5° below the mean for the corresponding month in 1909, when the early part of the summer was unseasonable like the present, although July last year had eighteen days with a temperature above 70°. The aggregate rainfall in the neighbourhood of London for July this year was 3.5 inches, which is 1.1 inches more than the normal, and rain fell on seventeen days. The aggregate for June and July this year is 5.6 inches, which is 1.2 inches less than for the corresponding two months last year. The duration of bright sunshine in July this year was 115 hours, which is only one-half the average, and is sixty hours less than in July last year.

THE visit of the German Association of Gas and Water Engineers to Great Britain, which was postponed on account of the death of King Edward, has now been arranged to take place during the week commencing October 2 next. The visitors are to be the guests of the Institution of Gas Engineers, the Gas Light and Coke Company, the South Metropolitan Gas Company, the Croydon Gas Company, and the Corporations of Edinburgh and Glasgow respectively, of which latter city the engineer of the gas department, Mr. Alex. Wilson, is now the president of the Institution of Gas Engineers.

AT the last meeting of the British Science Guild, held in the rooms of the Royal Geographical Society, communications were received from the Canadian and New South Wales sections of the Guild. In the case of the Canadian section, Lord Grey is resigning the presidentship on account of his departure, and it is hoped that Lord Strathcona will act as president in his place. No fewer than 120 members have joined the New South Wales section of the Guild, and important literature has been forwarded in connection with technical education and the report on open-air spaces for school children in Sydney. The agricultural memorial to the Prime Minister having received numerous signatures from representative agricultural societies and others was ordered to be submitted to the Prime Minister. The report of the committee on the synchronisation of clocks was finally approved, and it was decided to approach the Local Government Board by deputation and to ask the President to promote legislation on the subject.

ACCORDING to Miss F. Buchanan, writing in the July number of *Science Progress* on the significance of the pulse-rate in vertebrates, the relative size of the heart in different groups of animals depends on the amount of work it is called upon to perform. Thus in fishes, where it has only to pump the blood so far as the gills, the heart is always small, averaging 0.09 per cent. of the body-weight; but in the inert flat-fishes it is still smaller, being only about 0.04 per cent. of the body-weight. On the other hand, in birds, more especially migratory and vocal species, the heart has very heavy work to perform, and is consequently of great relative size, ranging from 1 to 2, or in a few cases 2.6, per cent. of the body-weight. In consequence of these differences in the amount of work the heart has to execute, its size bears no fixed relation to that of the animal to which it belongs. "The heart

of a pigeon, e.g., weighs twenty-five times that of a plaice of the same weight, and is about equal to that of a salmon fifteen times as heavy as the pigeon. A thrush, and a guinea-pig of six or seven times its weight, have hearts of about equal size."

In the *Psychological Bulletin* for June Dr. J. C. Hubbard describes a curious visual phenomenon resulting from stimulation of the macular region of the retina. It was first, and can be best, observed when the pupil is dilated by atropin, but it is also said to occur under ordinary conditions when any feeble source of light is viewed against a dark background. If, for example, "a patch of soft red colour, such as a ruby lamp wrapped with tissue paper, be viewed in a dark room, diffuse brushes of bluish tint are seen, apparently spreading laterally from it. With the right eye alone the brushes seem to extend to the right of the source, and with the left eye to the left." These brushes terminate at a point which is found to correspond to the position of the blind spot, for the source of light when not too large disappears if the eye be turned to the point of termination of the brushes. The brushes disappear in two or three seconds if the eye remains carefully fixed, but reappear upon slightly moving the eye. They also occur when the source of light is daylight, are brightest in orange-yellow and yellow spectral light, and are almost imperceptible in blue and violet light. Dr. Hubbard points out that the distribution of these brushes of blue light is strikingly similar to that of the bundles of optic nerve-fibres radiating from the macula to the blind spot. He suggests that certain stimuli, "passing from the macular region along these fibres to the optic nerve, are capable of inducing secondary effects in portions of the retina along which they pass."

THE preliminary announcement made in the *Times* of July 27, by Dr. Max O. Richter, of the discovery by Dr. K. Koritzky and himself of the site of the famous Cyprian temple of Aphrodite-Astarte will, if the facts are verified, rank justly as one of the most important archaeological events in recent years, and a well-deserved triumph for German science. We can only express the regret that, in spite of much exploration in Cyprus by British scholars, they have failed to secure the honour of this discovery. The clue to the supposed site of the temple at Rantidi, or Randi, was gained through the examination of some inscribed stones which were smuggled out of the country, the first having been accidentally found by a shepherd. Whether this be the shrine of the Paphian Venus or not, the remains are certainly numerous and interesting. The German archaeologists have taken measures to secure the rights of excavation, and Dr. Richter believes that the antiquities to be unearthed will prove to be so numerous that it will be necessary to erect a special museum for their reception, probably at Limassol. The examination of the shrine will probably solve the much debated question of the relation of the worship of the goddess to Oriental cults. In spite of the fact that the law protecting antiquities in Cyprus is severe, we regret to learn from Dr. Richter that many of the precious inscriptions have been removed from the ruins by the Government engineers and broken up for ballast for the new road from Nicosia to Limassol.

THE presidential address on "Nature and Nurture" delivered by Prof. Karl Pearson at the annual meeting of the Social and Political Education League in April last has been published by Messrs. Dulau and Co. in the Eugenics Laboratory Lecture Series. Prof. Pearson lays stress on the necessity for exact methods in the study of

sociological problems, and indicates the difficulty of analysing the resultant effects of nature and nurture so as to exhibit the relative importance of each factor. A few pedigrees are given illustrating the appalling extent to which abnormalities may be propagated by a fertile degenerate stock, and conversely the persistence of intellectual eminence in superior stocks; and the strength of nature is contrasted with that of nurture by two tables, the first showing correlations between parent and offspring or between members of the same family, and the second correlations between various factors taken as indices of environment and physical characters of children. Prof. Pearson concludes that "there is no real comparison between nature and nurture; it is essentially the man who makes his environment, and not the environment which makes the man." Not everyone will agree that the data are adequate to prove the conclusion, and from many of Prof. Pearson's *obiter dicta* the reader is likely to dissent; but the address gives a lucid and stimulating exposition, in popular language, of the lecturer's views.

NO. 1746 of the Proceedings of the U.S. Nat. Mus. is devoted to an account, by Mr. G. C. Embury, of a new species of amphipod crustacean, found in abundance in a large, spring-fed pond or lake some three acres in extent near Ashland, Virginia. When first collected, in 1908, they were referred to *Eucrangonyx gracilis*, but they are now found to be distinct, and described as *Eu. serratus*. Although these amphipods formed a portion of the food of at least three species of fishes, the thick fringe of vegetation round the pond, coupled with their rather rapid propagation, prevents any very great destruction of the crustaceans.

IN the July number of the *American Naturalist*, Mr. H. B. Wood discusses recent views as to the original source and spread of bubonic plague. Russian naturalists have urged that the bobac marmot (or perhaps some kindred central Asiatic species) is the sole originator of plague, and that it is permanently infected with the disease, thereby periodically re-infecting rats, and thus the human race, by means of fleas. The extermination of the bobac has, therefore, been demanded; but, as the author points out, there are probably other sources of original infection, and, in any case, certain American rodents have now become permanent centres of the disease. It is known, for instance, that a species of suslik, or ground-squirrel (*Spermophilus*, or *Citellus, beecheyi*), is plague-infected in California, and the same is the case with one of the wood-rats of the genus *Neotoma*, only in a less degree. Susliks may become infected *inter se* by the burrowing owl (*Speotito*) acting as flea-carrier, the fleas being probably carried from susliks to man by either cattle or rats, although direct transference from the former may take place. Two kinds of Californian rat-fleas will bite man, as will some suslik-fleas; and it has also been ascertained that rat-fleas will carry infection from rats to susliks, while suslik-fleas will carry it from one species of suslik to another, and likewise to rats and guinea-pigs.

AN account was given in the *Times* of July 26 of the deep-sea observations in the North Atlantic made by the *Michael Sars* expedition, which left Plymouth on April 7. It will be remembered that Sir John Murray liberally financed the expedition and took part in the cruise. The work was under the control of Dr. John Hjort, who had the assistance of Prof. Gran, Mr. Helland-Hansen, and Captain Iversen. Physical and biological investigations were made at most of the seventy-four observing stations. Upwards of 600 temperature observations at different

depths were recorded. The temperature observations agree very well with those of the *Challenger*, but the determinations of the salinity and density of the water have furnished new results. The measurements of the rate of the current in the Straits of Gibraltar showed that the limit between the upper (east going) and the lower (west going) currents is situated at a depth of between 50 and 100 fathoms, varying in depth with the tide. The greatest velocities measured were about five knots. In the warm waters of the Sargasso Sea, where the tow-nets of the German Plankton Expedition obtained few plants, the centrifuging of the water gave samples showing that the plants there consist of the smallest forms, which escape through the meshes of the finest silk nets; they were found in thousands to a depth of about 50 fathoms. Prof. Gran has recorded a great number of new species, and was able to make quantitative microscopic investigations, and thereby determine the vertical distribution of the different species. The temperature section across the Gulf Stream to the south of the Great Banks showed unexpected results. Both the temperature and the plankton indicate a counter-current at the southern border of the Gulf Stream. In consequence of this the *Michael Sars* followed the course of the Gulf Stream across the Atlantic, taking observations on the way, and the results will be published later.

IN No. 1749 of the Proceedings of the U.S. National Museum, Mr. A. H. Clark describes a new species of feather-star (*Antedon*) from the Adriatic, and discusses the relationships of the other European members of the genus. It appears that considerable differences in the size of the eggs and of their rate of development have been noted by several observers in European *Antedons* from different localities, although all the specimens were referred to the ordinary *A. rosacea*, the range of which was thus considered to extend from Norway to the Mediterranean. It was, however, suspected by all that the specific determination was unsatisfactory. Mr. Clark is now able to announce the existence of four European species—two from the Atlantic, for which the names of *pelasus* and *bifida* (= *rosacea*) are respectively available, and two from the Mediterranean, one of which should bear the name *mediterranea*. The two Mediterranean forms have long, slender arms, and numerous segmented long cirri, while in those from the Atlantic the arms and cirri are shorter and stouter, with fewer segments to the latter; further, it is believed that neither of the Atlantic species has infra-basal plates. These are, however, present in the Mediterranean forms; but the newly named *A. adriatica* has four or five, against three in *mediterranea*. The Mediterranean forms are more primitive than those from the Atlantic, which accords with the author's view that *Antedon* is primarily an Indian Ocean genus, where it is now represented by the more generalised *Mastigometra*.

TO No. 40 of the Zoological Society Bulletin, New York, July, Mr. W. T. Hornaday contributes an illustrated article on the collections of heads and horns of big game in the temporary "Administration Building" in that city. It appears that attention was recently directed to the poverty of American museums in specimens of this nature from Africa, and that this has resulted in a very gratifying effort on the part of sportsmen and collectors. We notice, however, that the specimens are exhibited on the walls of the apartments of the building without the protection of cases, and apparently exposed to strong light, which will assuredly lead to their rapid deterioration. Mr. Hornaday quotes certain pessimistic views as to the prospects of African big game, in which it is asserted that, in

from ten to fifteen years, all except that in protected areas will have been practically wiped out.

THE June number of the *Quarterly Journal of Microscopical Science* (vol. lv., part ii.) contains a valuable and beautifully illustrated monograph, by Mr. Cresswell Shearer, on the anatomy of *Histiobdella homari*. This very primitive segmented worm is said to be a normal inhabitant of the branchial chamber of the European lobster. The author concludes that the genus *Histiobdella* must be placed close to *Dinophilus*, but that it is more nearly related to the rotifers than the latter. Both genera show distinct relationships with *Polygordius* and *Protodrilus*, although they cannot be classed with these as true archiannelids. The same number contains Messrs. Allen and Nelson's interesting paper on the artificial culture of marine plankton organisms, already published in the *Journal of the Marine Biological Association* and noticed in these pages. Mr. Geoffrey Smith continues his studies in the experimental analysis of sex, and describes a case of parasitic castration in a cockerel, due to tubercle bacilli infecting the alimentary and lymphatic organs. He considers this case to be analogous to the parasitic castration of various invertebrates, such as that of the crab *Inachus* by the degenerate barnacle *Sacculina*. There are also three protozoological papers by Miss Annie Porter, Mr. C. M. Wenyon, and Mr. H. Lyndhurst Duke, all of a high standard of merit.

IN the *Annals of Tropical Medicine and Parasitology* (vol. iii., No. 5), there is a memoir by A. Breinl and E. Hindle on the life-history of *Trypanosoma lewisi* in the rat-louse, *Haematopinus spinulosus*. In experiments carried on for more than a year, the authors have succeeded three times in transmitting *T. lewisi* by means of the rat-louse. Cytological changes in the trypanosomes in the gut of the louse are described and figured. Amongst other articles in the same number, one by Sir Rubert Boyce and F. C. Lewis, on "The Effect of Mosquito Larvæ upon Drinking Water," may be especially noted. It is found by experiment that "the presence of larvæ in drinking water adds very considerably to the number of bacteria present," and *Cyclops* appears to produce the same effect.

THE eighteenth bulletin of the Sleeping Sickness Bureau contains a great deal of valuable information concerning the results of recent research upon all questions bearing directly or indirectly upon the etiology or treatment of trypanosomiasis of man and animals. It begins with an editorial article upon the transmission in nature of *Trypanosoma gambiense*, the main point at issue being whether the trypanosome of sleeping sickness is disseminated, under natural conditions, by *Glossina palpalis* alone or by other species of tsetse-flies also. Recent observations tend to arouse the suspicion that *G. fusca* and *G. morsitans* may, under certain conditions in nature, serve as hosts for the human trypanosome, and if this is true, "the difficulty of prevention would be enormously aggravated. The seriousness of the problem . . . makes it imperative that skilled investigations . . . be conducted without loss of time."

THE progress of palæobotany is marked by the appearance of a publication, *Die Palæobotanische Literatur*, of which the first volume, dealing with the literature that appeared in 1908, has been issued by the firm of Gustav Fischer, Jena. The bibliography not only cites papers devoted primarily to palæobotany, but includes papers on recent botany, in which fossil plants are discussed. The

greater part of the volume, which exceeds 200 pages, is taken up by the enumeration of genera and species with references to the various papers where they are mentioned. The compiler, Dr. W. J. Jongmans, of Leyden, makes an appeal for assistance in the shape of literature and papers as published.

THE systematic position of the tropical American genus *Phytelephas*, well known because the stone-like endosperm furnishes a cheap substitute for ivory, is discussed by Mr. O. F. Cook in vol. xiii., part v., of "Contributions from the United States National Herbarium." The author traces an affinity with *Manicaria*, a Central American genus, in the number of stamens and the fruit, besides noting an agreement with *Attalea* in the germination of the seedling. This leads to the formation of a family, *Manicariaceæ*, connecting the *Phytelephantaceæ* with the *Cocaceæ*. At the same time, the author controverts a family relationship between *Nipa* and *Phytelephas*.

PROF. H. MOLISCH communicates to the *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften*, Vienna (vol. cxviii., part ix.), a note on local coloration of the cell wall in certain water plants induced by manganese compounds. The introduction of manganese salts into cultures of *Elodea* produces, after a few days' exposure to light, a deposition of brown matter in the outer walls of the epidermis which on continued exposure tends to mask the green pigment in the leaf. The author notes that the deposition takes place only when the plant is exposed to light, and that a similar result was obtained in leaves of *Vallisneria*, *Ranunculus aquatilis*, and *Myriophyllum*. The chief point of interest lies in the fact that it furnishes a definite instance of localised action produced by the absorption of a specific element.

DURING the coming December an exhibition is to be held at Allahabad, at which a special feature will be the display of small light machinery for use in agriculture and the allied industries. A pamphlet entitled "Northern India as a Market for Agricultural Machinery" has been issued, not only with the purpose of interesting manufacturers in the exhibition, but to give useful information to those who have in the past found it difficult to ascertain the special requirements of the vast Indian market. It should serve its purpose admirably.

THE fertilising value of seaweed has for some time past been the subject of a long arbitration case in Scotland. From the reports that have appeared in the *North British Agriculturist*, it seems that three farmers were deprived of their rights to gather seaweed when the Admiralty resumed possession of the foreshore at Rosyth for the purposes of naval construction. The facts were not contested, and the only dispute was as to the value of the seaweed. Experts and practical men were called on both sides, and the values assigned varied from 1s. per ton to 9s. 3½d.; in the end the arbitrator fixed 4s. 9d. and awarded compensation on this basis. As the case has been going on for eight months a considerable amount of money must have been spent, while it cannot be said that any material addition to our knowledge of the subject has been gained in consequence. The problem could only be solved by experiment, and it is reverting to the methods of the mediæval schoolmen to attempt to settle it by collecting "opinions."

THE tobacco produced in India has not hitherto been held in high repute, nor has success been attained by the introduction of American varieties and methods of curing.

Mr. and Mrs. Howard have for some time been engaged in a study of the varieties already grown in the country, and have published their results in vol. iii. of the *Memoirs of the Department of Agriculture in India*. Perhaps no other factor in the production of high-grade tobacco is so important as uniformity in the crop, both as regards growth and also as regards the type of plant grown. Unless the crop ripens evenly the difficulties of harvesting and curing are increased, whilst a crop made up of several types of plant is not readily sorted out into uniform grades. The various types of *Nicotiana rustica* and *N. tabacum* are described in sufficient detail, and typical photographs are given. A great deal of patient work of this kind is necessary before the breeding of new varieties can usefully be begun.

PROF. A. L. ROTCH has contributed to the epitome of the *Aëronautical Annual*, 1910, a useful article on the relation of the wind to aerial navigation. After explaining the methods of investigating the upper air employed at Blue Hill Observatory and elsewhere by means of kites and sounding-balloons, he refers to the results of the upper wind observations in the eastern United States and to the recent discussion of the data by Mr. A. H. Palmer. The surface wind at Blue Hill (200 metres) has a mean annual velocity of 7.1 metres per second (15.8 miles per hour), and increases with height, as follows:—

Height in metres	55'	1000	250'	3500	5400	6400
Mean velocity, m.p.s.	9.8	10.7	12.5	15.5	24.9	27.1

and the increase continues to the greatest heights; at 9500 m. it is 35.8 m.p.s. (80.8 miles per hour). The mean range from summer to winter increases very greatly with height:—

Height in metres	200—1000	1000—3000	3000—5000	5000—7000
Velocity in summer	7.3	8.2	10.6	19.1
Velocity in winter	8.8	14.7	21.6	49.3

the velocity of the upper winds in winter being more than double the rate in summer. The velocity increases nearly twice as fast at night as in the daytime up to about 500 m.; above that height there is a decrease, except in winter, up to 1000 m., and then a steady increase. The author points out that at night a suitable level for aerial navigation in summer is 1000 m.; in the daytime it is necessary to ascend above the cumulus clouds. Over the temperate regions the surface winds are obviously constantly changing their direction; above these shifting winds, the balloons sent off from St. Louis showed that the direction is generally westerly. Above the height of a mile the mean direction was from west-north-west.

THE results of a series of investigations by Mecsrs. de Broglie and L. Brizard, on the ionisation of gases in presence of chemical reactions, are summarised by the authors in the June number of *Le Radium*. Of the three methods adopted by the authors, that in which the ultra-microscope is used has proved the most powerful. The chemical reaction to be investigated is carried out under the microscope and between two charged plates which produce an electrical field across the line of vision. Any charged particles produced by the reaction are moved towards one or the other plate, according to the sign of the charge. A large number of reactions have been observed in this way, and the authors conclude that in none is the ionisation, if produced, due primarily to the chemical reaction, but to secondary effects, such as the bubbling of a gas through a surface of separation of two fluids, or the breaking down of crystalline structure and the projection of particles which become charged by friction with the surrounding medium, or, lastly, to the incandescence produced by the heat of reaction. It will be

evident that many observations hitherto unexplained will be capable of explanation on lines suggested by these results.

In a paper entitled "Absorption and Adsorption with Reference to the Radio-active Emanations," published in the Bulletin of the Macdonald Physics Buildings of McGill University, Dr. R. W. Boyle shows that the radio-active emanations behave as all ordinary gases in obeying the laws of solution and of gaseous adsorption. In the case of thorium emanation, the experiments described show that the amount of emanation absorbed by charcoal is proportional to the concentration of the emanation in the gas in contact with it. The absorption also depends on the nature of the charcoal and the amount of surface exposed, and, as with ordinary gases, the absorption decreases with increase of temperature. On comparing the results of several experiments, it appears that thorium emanation is four times as soluble in water as radium emanation, but in petroleum the former is only half as soluble as the latter. Experiments with thorium emanation showed that this gas is less soluble in solutions such as copper sulphate and calcium chloride than in pure water, and the most powerful solvents used were petroleum and alcohol. The order of the solubilities of radium and thorium emanations in different solvents was found to be the same. The paper concludes with a brief notice of current ideas on adsorption, and there is appended a bibliography on the subjects treated.

THE University of Illinois Bulletin No. 41 contains an account of tests made on timber beams by Mr. A. N. Talbot. The tests were made with the view of adding data on the properties of timber in the form of stringers, as used in many railroad structures. The timber stringers were 8 inches by 16 inches by 15 feet to 7 inches by 12 inches by 14 feet in size. One hundred and twelve samples in all were tested, including long-leaf pine, short-leaf pine, loblolly pine, and Douglas fir. The load was applied equally at one-third points of the span length. The dimensions of the specimens were such as to bring out the strengths of timber in horizontal shear. The influence of knots, seasoning checks, and wind shakes can be traced in the results. Much of the data in existence is based on tests made on small specimens, and a valuable feature of the present series consists of the results of tests on minor specimens cut from the stringers. The flexural and shearing strengths of these smaller specimens were determined, and the relation of their properties to those of the full-sized stringers may be studied from the results given. In addition to many tables of results, the bulletin includes photographs showing characteristic fractures under the bending and shearing tests.

OUR ASTRONOMICAL COLUMN.

A CENTRAL BUREAU FOR METEOR OBSERVATIONS.—Under the auspices of the Astronomical Society of Antwerp, a central office has been established for the collection and coordination of observations of meteors. A beginning was made in 1907, and in twenty-two months 5960 observations were recorded by forty observers in thirty-six localities. This essay showed that a much wider organisation was desirable, and the new Bureau Central Meteorique hopes to receive the cooperation of all observers of meteors, amateurs and otherwise, the world over. In the Publication No. 1 is given a complete set of directions and advice, so that anyone, astronomer or not, who can observe regularly, may at once join in the international cooperative scheme. In a circular which accompanies the publication, M. Birkenstock points out that the expenses of the new

organisation will be large, and asks all those interested in meteoric astronomy to assist by making an annual subscription of at least 5 francs.

THE ROTATION OF SUN-SPOTS.—To No. 4429 of the *Astronomische Nachrichten* Herr P. Kempf contributes some interesting results derived from sun-spot observations made during 1891-3.

A number of solar observers have been unable to establish any definite rotation of sun-spots, but here the observer shows from careful observations that in thirteen cases there was a distinct rotatory movement of the spot about its own centre. Seven of these occurred in the northern, and six in the southern, hemisphere, but there appears to be no relation between the direction of the rotation and the latitude—north or south—of the spot; only in two cases in each hemisphere was the motion in the negative (i.e. N.W.S.E.) direction. In one case (Greenwich spot-number 2277, August 5-16, 1891) the spot rotated 139° in eleven days, while the average daily motions ranged between 7° and 37° ; for the northern hemisphere the mean was 11° , and for the southern 20° .

HALLEY'S COMET.—An interesting popular summary of the phenomena presented by Halley's comet during its recent apparition is published in the July number of *The World To-day* by Prof. Frost. Discussing the "never-to-be-forgotten spectacle" presented by the 100° tail seen about the time of the comet's passage, Prof. Frost affirms that the earth probably passed through a part of the tail on the morning of May 19, and suggests that we were within the forks, or separate streamers, of it for two days following, hence the east and west tails. The strangely iridescent clouds, with a kind of horizontal "rainbow," seen at the horizon, may also have been due, at least in part, to the presence of cometary dust.

Some excellent photographs were secured by Mr. Ellerman, who led a comet expedition to the Hawaiian Islands.

LARGE METEORITES.—A description of the Guffey meteorite, discovered by two cowboys near Guffey, Park County, Colorado, in 1907, is given by Mr. Edmund O. Hovey in a reprint from the *American Museum Journal*, vol. ix., pp. 237-48.

This object is a siderite 36.5 inches long, 15 inches maximum height, and 8 inches wide. The mass is roughly pear-shaped, and weighs 682 lb. Two sides show well-developed "thumb marks" or "piëzoglyphs," but on another, which is nearly straight, these are not so well developed; the author suggests that the straight edge and lack of marks indicate that the mass split into two or more parts when near the end of its flight, and that another part may, therefore, yet be found. The mass is very homogeneous, and chemical analysis shows it to contain 88.7 per cent. Fe, 10.5 per cent. Ni, 0.5 per cent. Co, with traces of Cr, C, S, and P; the specific gravity is 7.939. It is supposed that this may be the remains of a vivid meteor which was observed to pass over the Freshwater River region during the autumn of 1906; it now lies in the foyer of the American Museum.

Mr. Hovey also describes two other recent additions to the foyer, viz. a slice and cast of the Gibeon meteorite and the largest known portion of the Modoc meteorite. The Gibeon meteorite, weighing 562 lb., was discovered in Great Namaqua Land (lat. $25^\circ 8' S.$, long. $17^\circ 50' E.$), and is in the possession of the Hamburg Natural History Museum. A slice of this and a plaster cast were sent to the American Museum, where it is ingeniously mounted with the slice *in situ*, the two halves of the cast being hinged so as to show the complete form with the polished surface of the slice.

The "Modoc" is the largest known portion (20 lb. 3 oz.) of a meteorite seen to fall near Modoc, Scott County, Kansas, on September 2, 1905. Twenty-five fragments have been found, and, where pieces have been broken off by the plough, the meteorite is shown to be composed of whitish stony material containing bright specks of iron.

Photographs of the Guffey and Gibeon meteorites illustrate the paper.

THE UNITED STATES NAVAL OBSERVATORY.—The report by the superintendent for the year ending June 30, 1909, shows that the Astronomical Council, consisting of the various officers and assistants at the U.S. Naval Observa-